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| 09/841,908 | 04/25/2001 | Bruce L. Bruso | 147363/9079-6US | 7563 |

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| EXAMINER |
|---|
| MITCHELL, KATHERINE W |

| ART UNIT | PAPER NUMBER |
|---|---|
| 3677 | |

DATE MAILED: 09/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) |
|---|---|---|
| | 09/841,908 | BRUSO, BRUCE L. |
| | Examiner | Art Unit |
| | Katherine W Mitchell | 3677 |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *11 August 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *3-7 and 10-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3-7,11-13,15,16,18,19 and 21* is/are rejected.

7)☒ Claim(s) *10,14,17 and 20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on *n/a* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION

Claims 3-7 and 10-21 are pending. Claims 1-2 and 8-9 were cancelled; claims 17-21 were added.

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 3-4, 13-16, and 19 are rejected under 35 U.S.C. 102(b) as anticipated by Siegrist et al., "Principles and Practices of In Situ Chemical Oxidation using Permanganate", hereafter called the Siegrist reference, or, in the alternative, under 35 U.S.C. 103(a) as obvious over Siegrist in view of Manchak USP 4844807, hereafter called Manchak 807. For clarification, examiner notes that the Siegrist reference is being used to document that a method was in public use, and it is the public use which is actually the 102 (b) teaching.

Re claims 3 and 13-14: The Siegrist reference teaches in page 20 and pages 277-285 that in 1977, the DOE plant in Kansas City, Mo used a method of soil

remediation to reduce the level of organic contaminants in soil, comprising churning or comminuting the contaminated soil in situ with a soil mixing device (Fig 7-17, pages 281-282), during churning, injecting hot air into the contaminated soil as it is being churned to thermally strip off organic compounds (last line page 281- 7th line page 282) to decrease the contaminate level to a level still above target level, and introducing a chemical oxidizing agent into the soil to continue reducing the contaminant level of the contaminant thermally stripped by the hot air injection until the contaminant is further reduced to a level at or below the target level (Fig 7-19). Air stripping is disclosed as the initial treatment step, and the difference in cost of permanganate versus air and the possibly undesirable by-products of large amounts of permanganate would explain the implied teaching that the air stripping is used until it is no longer practically effective, and then the permanganate would be used to complete the remediation. Examiner notes that hot air is a relative term, and the fact that the Siegrist reference teaches that the injected air volatilizes the compounds inherently teaches that the air is hot relative to the vaporization point of the compound. While examiner believes that the Siegrist reference does teach that hot air is injected until thermal stripping is no longer effective in reducing contaminants, examiner is presenting an alternative argument to speed prosecution in case it is interpreted that the element is not inherently taught. Manchak 807 specifically teaches using a soil remediation method comprising soil comminutation, hot vapor injection, and chemical oxidant, such as permanganate, injection, for volatile organic contaminants in the abstract, col 2 lines 45-66, and col 9 lines 4-34. Manchak 807 teaches in col 3 lines 38-61 teach that hot fluid, which can include air, is used to

volatilize organics, and is used until the "zone is detoxified to a desired degree". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Siegrist reference to include using the remediation method specifically on organic contaminants in soil, and to use vapor extraction until no longer practically effective, in view of Manchak 807, in order to specifically ensure that volatile contaminants, such as organics, would be treated with the method to obtain a large application and customer base and to maximize the use of inexpensive baseline treatments prior to employing secondary treatments requiring additional materials and labor.

Re claims 15 and 19: The Siegrist reference teaches TCE is the volatile organic contaminant in page 278, lines 9-16.

Re claims 4 and 16: The Siegrist reference teaches potassium permanganate as the chemical oxidizer on page 277, 1st paragraph under section 7.4. (Site 3) and on page 282 lines 7-12 and Table 7-4.

4. Claims 3-4 and 13-16, 18,19, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoag et al. USP 6019548 in view of Manchak 807.

Re claims 3 and 13-14: Hoag teaches in the abstract and col 3 line 57-col 4 line 28 a method of soil remediation to reduce the level of organic contaminants in soil, comprising mixing a soil oxidizer in situ with soil to decrease the organic contaminate level to a level still above target level, and introducing a chemical oxidizing agent, such as potassium permanganate into the soil to continue reducing the contaminant level of the contaminant until the contaminant is further reduced to a level at or below the target

level. However, Hoag does not teach hot air injection for 1st stage thermal stripping of the contaminants, nor does Hoag teach physically churning the soil with a mixing device. Manchak 807 specifically teaches using a soil remediation method comprising soil comminutation by a soil mixing device and hot vapor injection (col 2 lines 63-66 and col 8 lines 23-68), and chemical oxidant injection, such as permanganate injection, for volatile organic contaminants in the abstract, col 2 lines 45-66, and col 9 lines 4-34. Manchak 807 teaches in col 3 lines 38-61 teach that hot fluid, which can include air, is used to volatilize organics, and is used until the "zone is detoxified to a desired degree". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Hoag to include using a 2-stage remediation method on organic contaminants in soil, in view of Manchak 807, first using hot vapor extraction until no longer practically effective, and then using chemical oxidation with permanganate in order to specifically ensure that any oxidation of soil and subsequent thermal desorption of volatile organics would be treated first to minimize the use of potassium permanganate required and thus minimize the clogging byproducts and use of expensive chemical treatments, as discussed in Hoag in col 2 lines 44-53 and col 5 lines 13-43.

Re claims 15,18,19, and 21: Hoag teaches TCE, PCE (tetrachloroethylene), vinyl chloride, methylene chloride and others as the volatile organic contaminant in col 1 lies 15-29.

Re claims 4 and 16: Hoag teaches potassium permanganate as the oxidizer in col 3 line 57-col 4 line 29.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Siegrist reference in view of Manchak 807 as applied above, and further in view of Knauss et al USP 6127592. As discussed above, the Siegrist reference in view of Manchak 807 as applied above teach all the elements except preheating the soil to be treated with a ground heater system prior to introducing the chemical oxidizing agent. It is a well-known principle of reaction kinetics and thermodynamics that oxidation reactions require energy ($\Delta H_{reaction}$), and that reaction rates increase as temperature increases; in fact, kinetic rate equations are generally written k(t), to show that they depend on temperature. Knauss et al. teaches in col 1 line 64 – col 2 line 10 that subsurface organic contamination may be limited by its solubility in water and other mass-transfer limitation, which thermal treatment overcomes by increasing diffusion/sorption/desorption rates and solubilities of contaminants. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Siegrist reference in view of Manchak 807 as applied above to include preheating the soil to be treated with a ground heater system prior to introducing the chemical oxidizing agent, as taught by basic scientific principles and Knauss et al., in order to increase both the reaction rate and the reaction yield of the contaminant/ oxidation agent reaction.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Hoag in view of Manchak 807 as applied above, and further in view of Knauss et al USP 6127592. As discussed above, Hoag in view of Manchak 807 as applied above teach all the elements except preheating the soil to be treated with a ground heater system

prior to introducing the chemical oxidizing agent. It is a well-known principle of reaction kinetics and thermodynamics that oxidation reactions require energy ($\Delta H_{reaction}$), and that reaction rates increase as temperature increases; in fact, kinetic rate equations are generally written k(t), to show that they depend on temperature. Knauss et al. teaches in col 1 line 64 – col 2 line 10 that subsurface organic contamination may be limited by its solubility in water and other mass-transfer limitation, which thermal treatment overcomes by increasing diffusion/sorption/desorption rates and solubilities of contaminants. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Hoag in view of Manchak 807 as applied above to include preheating the soil to be treated with a ground heater system prior to introducing the chemical oxidizing agent, as taught by basic scientific principles and Knauss et al., in order to increase both the reaction rate and the reaction yield of the contaminant/ oxidation agent reaction.

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Siegrist reference in view of Manchak 807 as applied above, and further in view of Vinegar et al. US Patent 5190405. As discussed above, the Siegrist reference in view of Manchak 807 as applied above teach all the elements except preheating the soil to be treated with a ground heater system prior to introducing the chemical oxidizing agent, or that a thermal insulation is laid over the soil after introducing the chemical oxidizing agent. It is a well-known principle of reaction kinetics and thermodynamics that oxidation reactions require energy ($\Delta H_{reaction}$), and that reaction rates increase as temperature increases; in fact, kinetic rate equations are generally written k(t), to show

that they depend on temperature. Vinegar et al. teaches that insulating blankets can be used over soil remediation wells to retain heat in the soil in the abstract. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Siegrist reference in view of Manchak 807 as applied above to include covering the remediation site with an insulating cover prior to oxidation, as taught by basic scientific principles and Vinegar et al., in order to increase both the reaction rate and the reaction yield of the contaminant/oxidation agent reaction.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Hoag in view of Manchak 807 as applied above, and further in view of Vinegar et al. US Patent 5190405. As discussed above, Hoag in view of Manchak 807 as applied above teach all the elements except preheating the soil to be treated with a ground heater system prior to introducing the chemical oxidizing agent, or that a thermal insulation is laid over the soil after introducing the chemical oxidizing agent. It is a well-known principle of reaction kinetics and thermodynamics that oxidation reactions require energy ($\Delta H_{reaction}$), and that reaction rates increase as temperature increases; in fact, kinetic rate equations are generally written k(t), to show that they depend on temperature. Vinegar et al. teaches that insulating blankets can be used over soil remediation wells to retain heat in the soil in the abstract. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Hoag in view of Manchak 807 as applied above to include covering the remediation site with an insulating cover prior to oxidation, as taught by basic scientific

principles and Vinegar et al., in order to increase both the reaction rate and the reaction yield of the contaminant/oxidation agent reaction.

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Siegrist reference in view of Manchak 807 and further in view of Bruso, US Patent 5830752 and Siegrist et al. USP 6102621, hereafter called Siegrist 621.

The Siegrist reference teaches in page 20 and pages 277-285 that in 1977, the DOE plant in Kansas City, Mo used a method of soil remediation to reduce the level of organic contaminants in soil, comprising churning or comminuting the contaminated soil in situ with a soil mixing device (Fig 7-17, pages 281-282), during churning, injecting hot air into the contaminated soil as it is being churned to thermally strip off organic compounds (last line page 281- 7$^{th}$ line page 282) to decrease the contaminate level, and introducing a chemical oxidizing agent, such as potassium permanganate (page 282 lines 7-12), into the soil to continue reducing the contaminant level of the contaminant thermally stripped by the hot air injection until the contaminant is further reduced to a level at or below the target level (Fig 7-19). Air stripping is disclosed as the initial treatment step, and the difference in cost of permanganate versus air and the possibly undesirable by-products of large amounts of permanganate would explain the implied teaching that the air stripping is used until it is no longer practically effective, and then the permanganate would be used to complete the remediation. Examiner notes that hot air is a relative term, and the fact that the Siegrist reference teaches that the injected air volatilizes the compounds inherently teaches that the air is hot relative to the vaporization point of the compound. While examiner believes that the Siegrist

reference does teach that hot air is injected until thermal stripping is no longer effective in reducing contaminants, examiner is presenting an alternative argument to speed prosecution in case it is interpreted that the element is not inherently taught. Manchak 807 specifically teaches using a soil remediation method comprising soil comminutation, hot vapor injection, and chemical oxidant, such as permanganate, injection, for volatile organic contaminants in the abstract, col 2 lines 45-66, and col 9 lines 4-34. Manchak 807 teaches in col 3 lines 38-61 teach that hot fluid, which can include air, is used to volatilize organics, and is used until the "zone is detoxified to a desired degree". However, the Siegrist reference does not teach that the mixing device is a trencher or that the potassium permanganate is added as a crystalline powder.

Bruso teaches a method for in situ soil remediation using a trencher to comminute the soil in the abstract and Fig. 3.

Siegrist 621 teaches in col 2 lines 62-76 and col 4 lines 10-61 and col 5 lines 1-14 a method of injecting granular chemical oxidizers into contaminated soil for remediation of organic contamination. Col 4 line 65 also teaches that the treating chemical oxidizer can be potassium permanganate. (Examiner notes that applicant has provided no criticality for adding the oxidizer as a powder and has, in fact, equated the use of powder and liquid forms of permanganate, but examiner is addressing the limitation to speed prosecution.)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Siegrist reference in view of Manchak 807 to include using comminuting tools such as a trencher, as taught by Bruso, in order

to remediate soil in a continuous, cost-effective and relatively rapid manner and to use a tool known to effectively comminute the soil and reduce its density to facilitate volatile stripping methods, and to introduce the chemical oxidizer in granular or crystalline powder form, as taught by Siegrist 621, in order to extend the treatment zone over a wider area than the injection zone and minimize the pumping requirements, as described in the Siegrist 621 abstract and col 2 lines 27-43.

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Siegrist reference in view of Manchak 807 and Bruso and Siegrist 621 as applied to claim 7 above, and further in view of Knauss et al USP 6127592. As discussed above, the Siegrist reference in view of Manchak 807 and Bruso and Siegrist 621 as applied above teach all the elements except preheating the soil to be treated with a ground heater system prior to introducing the chemical oxidizing agent. It is a well-known principle of reaction kinetics and thermodynamics that oxidation reactions require energy ($\Delta H_{reaction}$), and that reaction rates increase as temperature increases; in fact, kinetic rate equations are generally written k(t), to show that they depend on temperature. Knauss et al. teaches in col 1 line 64 – col 2 line 10 that subsurface organic contamination may be limited by its solubility in water and other mass-transfer limitation, which thermal treatment overcomes by increasing diffusion/sorption/desorption rates and solubilities of contaminants. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Siegrist reference in view of Manchak 807 and Bruso and Siegrist 621 as applied to claim 7 above, to include preheating the soil to be treated with a

ground heater system prior to introducing the chemical oxidizing agent, as taught by basic scientific principles and Knauss et al., in order to increase both the reaction rate and the reaction yield of the contaminant/ oxidation agent reaction.

11. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Siegrist reference in view of Manchak 807 and Bruso and Siegrist 621 as applied to claim 7 above, and further in view of Vinegar et al. US Patent 5190405. As discussed above, the Siegrist reference in view of Manchak 807 and Bruso and Siegrist 621 as applied to claim 7 above teach all the elements except preheating the soil to be treated with a ground heater system prior to introducing the chemical oxidizing agent, or that a thermal insulation is laid over the soil after introducing the chemical oxidizing agent. It is a well-known principle of reaction kinetics and thermodynamics that oxidation reactions require energy ($\Delta H_{reaction}$), and that reaction rates increase as temperature increases; in fact, kinetic rate equations are generally written k(t), to show that they depend on temperature. Vinegar et al. teaches that insulating blankets can be used over soil remediation wells to retain heat in the soil in the abstract. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Siegrist reference in view of Manchak 807 and Bruso and Siegrist 621 as applied to claim 7 above, and further in view of Vinegar to include covering the remediation site with an insulating cover prior to oxidation, as taught by basic scientific principles and Vinegar et al., in order to increase both the reaction rate and the reaction yield of the contaminant/oxidation agent reaction.

***Allowable Subject Matter***

12. Claims 10,14,17,and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Examiner considers the disclosed method, including a method step of deliberately treating with air stripping until air stripping is no longer practically effective, or deliberately air stripping until the contaminant is reduced by more that 50% of its original level before beginning chemical oxidation, while sequentially introducing a chemical oxidizing agent to the soil during or after the air stripping step, as an inventive step over the prior art of record.

***Response to Arguments***

13. Applicant's arguments with respect to claims 3-5, 7-9, 11-13, and 15-16 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine W Mitchell whose telephone number is 703-305-6713. The examiner can normally be reached on Mon - Thurs 10 AM - 8 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, J. J. Swann can be reached on 703-306-4115. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-4180.

Kwm
9/10/2003

J. J. SWANN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3600